

STORMWATER TREATMENT SYSTEM

PART 1.00 GENERAL

1.1 DESCRIPTION

A. Work included:

The Contractor, and/or a manufacturer selected by the Contractor and approved by the Engineer, shall furnish all labor, materials, equipment and incidentals required and install all precast concrete stormwater treatment systems and appurtenances in accordance with the Drawings and these specifications. Substitutions for the specified product(s) will be considered only if the proposed alternate meets or exceeds the performance criteria as listed in section 2.2 of this specification. Any proposed substitutions must be reviewed by the engineer and submitted to the governing regulatory agency for final approval.

1.2 QUALITY CONTROL INSPECTION

- A. The quality of materials, the process of manufacture, and the finished sections shall be subject to inspection by the Engineer. Such inspection may be made at the place of manufacture, or on the work site after delivery, or at both places, and the sections shall be subject to rejection at any time if material conditions fail to meet any of the specification requirements, even though sample sections may have been accepted as satisfactory at the place of manufacture. Sections rejected after delivery to the site shall be marked for identification and shall be removed from the site at once. All sections which have been damaged beyond repair during delivery will be rejected and, if already installed, shall be repaired to the Engineer's acceptance level, if permitted, or removed and replaced, entirely at the Contractor's expense.
- B. All sections shall be inspected for general appearance, dimensions, soundness, etc. The surface shall be dense, close textured and free of blisters, cracks, roughness and exposure of reinforcement.
- C. Imperfections may be repaired, subject to the acceptance of the Engineer, after demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be carefully inspected before final acceptance. Cement mortar used for repairs shall have a minimum compressive strength of 4,000 psi (28 MPa) at the end of 7 days and 5,000 psi (34 MPa) at the end of 28 days when tested in 3-inch (76 mm) diameter by 6-inch (152 mm) long cylinders stored in the standard manner. Epoxy mortar may be utilized for repairs.

1.3 SUBMITTALS

Shop Drawings

The Contractor shall be provided with dimensional drawings and, when specified, utilize these drawings as the basis for preparation of shop drawings showing details for construction, reinforcing, joints and any cast-in-place appurtenances. Shop drawings shall be annotated to indicate all materials to be used and all applicable standards for materials, required tests of materials and design assumptions for structural analysis. Shop drawings shall be prepared at a scale of not less than 3/16-inches per foot (1:75). Six (6) hard copies of said shop drawings shall be submitted to the Engineer for review and approval.

PART 2.00 PRODUCTS

2.1 MATERIALS AND DESIGN

- A. Concrete for precast stormwater treatment systems shall conform to ASTM C857 and C478 and meet the following additional requirements:
 - 1. In all cases the wall thickness shall be no less than the minimum thickness necessary to sustain HS20-44 (MS18) loading requirements as determined by a Licensed Professional Engineer.
 - 2. Sections shall have tongue and groove or ship-lap joints with a butyl mastic sealant conforming to ASTM C 990.
 - 3. Cement shall be Type I, II, or III Portland cement conforming to ASTM C 150.
 - 4. All sections shall be cured by an approved method. Sections shall not be shipped until the concrete has attained a compressive strength of 4,000 psi (28 MPa) or other designate suitable handling strength.
 - 5. Pipe openings shall be sized to accept pipes of the specified size(s) and material(s), and shall be sealed by the Contractor with a hydraulic cement conforming to ASTM C 595M
- B. All internal components shall be PVC per ASTM D1785, and aluminum alloy 5052-H32 plate in accordance with ASTM B 209.
- C. Brick or masonry used to build the manhole frame to grade shall conform to ASTM C 32 or ASTM C 139 and shall be installed in conformance with all local requirements.
- D. Casting for manhole frames and covers shall be in accordance with ASTM A48, CL.35B and AASHTO M105. The manhole frame and cover shall be equivalent to Campbell Foundry Pattern #1009A.
- E. A bitumen sealant in conformance with ASTM C 990 shall be utilized in affixing the aluminum bays to the concrete vault.

2.2 PERFORMANCE

Each stormwater treatment system shall have treatment, sediment storage, and oil storage capacities equal to or greater than that shown in Table 2.1 for the corresponding model as specified on the project plans. For the purpose of determining equivalency, the treatment capacity shall be defined as the flow rate at which the stormwater treatment system removes 80% TSS. Treatment capacity shall be additionally defined as the maximum flow rate prior to which bypass of any flow occurs.

Table 2.1

VortSentry® HS Model	Treatment Capacity		Sediment Storage		Oil Storage	
	cfs	l/s	yd³	m³	gal	Liter
HS36	0.55	15.6	0.5	0.4	75.4	285.4
HS48	1.2	34.0	0.9	0.7	137.1	518.9
HS60	2.2	62.3	1.5	1.1	214.2	810.8
HS72	3.7	104.8	2.1	1.6	308.4	1167.6
HS84	5.6	158.6	2.8	2.1	412.0	1559.5
HS96	8.1	229.4	3.7	2.8	544.2	2059.9

Each stormwater treatment system shall provide documented full-scale testing that corroborates the capacities as listed in Table 2.1 and defined above. Said documentation shall include at a minimum testing for removal capabilities and sediment wash-out characteristics at the treatment capacities listed in Table 2.1.

Each stormwater treatment system shall have the capability of bypassing high flow internally as well as controlling flow through the treatment chamber so as to avoid wash-out of previously captured pollutants under high flow conditions.

Each stormwater treatment system shall include a circular chamber with a tangential inlet to induce a swirling flow pattern within the treatment chamber. The outlet from the treatment chamber shall be located in the center of the chamber so as to maximize the particle flow path within the treatment system.

Each stormwater treatment system shall be of a hydraulic design that includes flow controls designed and certified by a professional engineer using accepted principles of fluid mechanics that raise the water surface inside the tank to a pre-determined level in order to prevent the re-entrainment of trapped floating contaminants.

Each stormwater treatment system shall be designed to not allow surcharge of the upstream piping network during dry weather conditions.

Each stormwater treatment system shall be contained within one concrete manhole structure.

MANUFACTURER

The manufacturer of said system shall have been regularly engaged in the engineering design and production of systems for the physical treatment of stormwater runoff for 15 years.

Each stormwater treatment system shall be a VortSentry® HS system as manufactured by CONTECH Stormwater Solutions Inc, 200 Enterprise Drive, Scarborough, Maine 04074, phone: 207-885-9830, fax: 207-885-9825.

PART 3.00 EXECUTION

3.1 INSTALLATION

- A. Each Stormwater Treatment System shall be constructed according to the sizes shown on the Drawings and as specified herein. Install at elevations and locations shown on the Drawings or as otherwise directed by the Engineer.
- B. Place the precast base unit on a granular subbase of minimum thickness of six inches (152 mm) after compaction or of greater thickness and compaction if specified elsewhere. The granular subbase shall be checked for level prior to setting and the precast base section of the trap shall be checked for level at all four corners after it is set. If the slope from any corner to any other corner exceeds 0.5% the base section shall be removed and the granular subbase material re-leveled.
- C. Prior to setting subsequent sections place bitumen sealant in conformance with ASTM C 990-91 along the construction joint in the section that is already in place.
- D. After setting the precast roof section of the stormwater treatment system, set precast concrete manhole riser sections, to the height required to bring the cast iron manhole covers to grade, so that the sections are vertical and in true alignment with a 1/4-inch (6 mm) maximum tolerance allowed. Backfill in a careful manner, bringing the fill up in 6-inch (152 mm) lifts on all sides and compacting the granular bedding to 95% Standard Procter Density per ASTM D698. If leaks appear, clean the inside joints and caulk with lead wool to the satisfaction of the Engineer. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of Stormwater Treatment Systems shall conform to ASTM specification C 891 "Standard Practice for Installation of Underground Precast Utility Structures".
- E. Holes made in the concrete sections for handling or other purposes shall be plugged with a nonshrink grout or by using grout in combination with concrete plugs.
- F. Where holes must be cut in the precast sections to accommodate pipes, do all cutting before setting the sections in place to prevent any subsequent jarring which may loosen the mortar joints. The Contractor shall make all pipe connections.